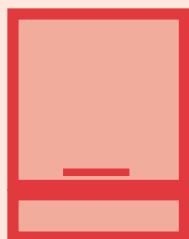


Safe working with flammable substances





INTRODUCTION

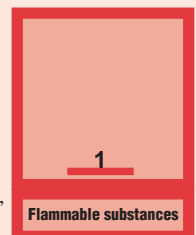
Small quantities of dangerous goods can be found in most workplaces. Whatever they are used for, the storage and use of such goods can pose a serious hazard unless basic safety principles are followed. If you use one particular group of dangerous goods - flammable and explosive substances - this leaflet will help you to:

- ◆ be aware of the hazards of various types of flammable substance;
- ◆ be aware of the basic standards which apply to safe handling and storage of flammable substances;
- ◆ introduce procedures to prevent accidents and protect people from the hazards of flammable substances;
- ◆ find more detailed information when you need it.

There is an enormous variety of flammable substances to be found in the workplace. They range from the obvious, eg petrol, paint thinners, welding gases and heating fuels, to the not so obvious, eg packaging materials, dusts from woodworking and dusts from food stuffs such as flour and sugar etc.

Three ingredients are needed for a fire: a fuel at the right concentration, a good supply of air, and a source of ignition. If you control these ingredients, fires can be prevented.

Note: This leaflet does not cover products which are intentional explosives, including fireworks. Advice on the legislation and guidance relevant to these products can be obtained from the HSE Hazardous Installations Directorate, HIDCD5, Magdalen House, Stanley Precinct, Bootle, Merseyside L20 3QZ.



SAFETY PRINCIPLES

By applying the following five principles you will be well on the way to making sure that you are working safely with flammable substances.



Ventilation

Is there plenty of fresh air where flammable liquids or gases are stored and used? Good ventilation will mean that any vapours given off from a spill, leak, or release from any process, will be rapidly dispersed.



Ignition

Have all the obvious ignition sources been removed from the storage and handling areas? Ignition sources can be very varied and they include sparks from electrical equipment or welding and cutting tools, hot surfaces, open flames from heating equipment, smoking materials etc.



Containment

Are your flammable substances kept in suitable containers? If you have a spill will it be contained and prevented from spreading to other parts of the working area? Use of lidded containers and spillage catchment trays, for example, can help to prevent spillages spreading.





Exchange

Can you exchange a flammable substance for a less flammable one?
Can you eliminate flammable substances from the process altogether?

You may be able to think of other ways of carrying out the job more safely.



Separation

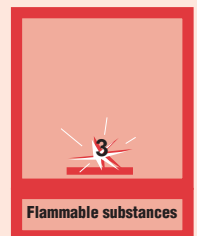
Are flammable substances stored and used well away from other processes and general storage areas? Can they be separated by a physical barrier, wall or partition? Separating your hazards in this manner will contribute to a safer workplace.

Think about the flammable substances you have in the workplace and apply these five principles wherever possible. Tell workers, and others who need to know, about the hazards and how they should control them.

Think



- keep a strong grip on your workplace safety.



SPECIFIC MATERIALS

The following sections deal with specific types of flammable substances. The precautions mentioned need to be considered in addition to the **VICES** principles just described.



Flammable liquids

Flammable liquids can give off large volumes of flammable vapours at room temperature. These vapours, when mixed with air, can ignite, often violently. Spilled flammable liquids can, if not contained, flow a long way to an ignition source, and then flash back to the source of the leak. Spills on clothing can represent a serious risk of injury if ignited. To help control these risks:

- ◆ store flammable liquids in a separate storage area, or in a purpose-made bin or cupboard;
- ◆ dispense and use them in a safe place where there is good ventilation and no source of ignition;
- ◆ keep containers closed when not in use. If possible, use safety containers which have self-closing lids;
- ◆ dispense liquids over a tray and keep some non-flammable absorbent material handy to mop up spills;
- ◆ dispose of contaminated materials safely or call in disposal experts.





Flammable dusts

Finely divided flammable dusts dispersed in the workplace atmosphere can, if ignited, explode violently and cause a lot of damage. If you handle flammable dusts you need to remember the

following:

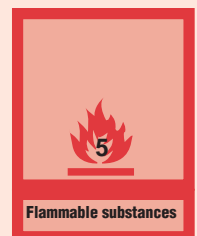
- ◆ keep plant dust-tight;
- ◆ keep the working area dust-free by regular cleaning, and vacuuming spillages as they occur;
- ◆ some dust handling plant has special safety features built in. The purpose of these needs to be properly understood, and they should be maintained in good working order.



Flammable solids

Some types of plastic foam, packaging materials, polyester wadding and textiles will ignite easily and burn fiercely, giving off a lot of dense black smoke. Remember:

- ◆ do not store these materials close to heaters or electrical equipment which could run hot and act as a local ignition source;
- ◆ make sure that gangways and exits from storage and working areas are kept clear of packaging materials, finished products containing flammable solids etc. In the event of fire, gangways and exits could become obscured by smoke, so the easier they are to find, the better.





Flammable gases

Gases in cylinders are often stored at very high pressures, and so their uncontrolled release can be physically dangerous. A small amount of released gas can fill a large area with a potentially explosive mixture. This is particularly true of liquefied gases such as LPG. The following points need to be considered:

- ◆ stored cylinders need to be suitably restrained and their valves protected from impact damage;
- ◆ gas cylinders may need special valves, fittings and hoses. Always check the manufacturers' or suppliers' instructions and fit the correct equipment;
- ◆ protect hoses from potential causes of damage that could cut, scuff or weaken them. Examine them regularly and replace them if they show signs of damage or wear that could give rise to a leak.



Oxygen

Although oxygen is necessary for life and is an essential ingredient in controlled burning, such as in a gas fire or oxy-fuel gas welding and cutting, its misuse can lead to serious consequences. Materials that ordinarily will burn only slowly will burn very vigorously in an oxygen-enriched atmosphere. Others such as greases and oils may burst into flames in this kind of atmosphere. As well as the precautions outlined above for flammable gases, the following points should be remembered:

- ◆ never use oxygen instead of compressed air;



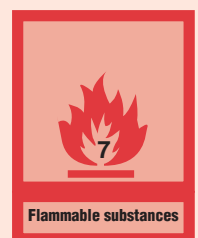
- ◆ never use oxygen to sweeten the air in a working area or confined space;
- ◆ never use grease or oil on equipment containing oxygen.



Reactive chemicals

Some products contain chemicals, such as organic peroxides, which can explode if they are not stored and handled correctly. Other substances can react vigorously with incompatible materials or contaminants. For example, oxidising chemicals can cause flammable materials to ignite, and some substances, such as sodium, react violently with water and can ignite. The following points need to be considered:

- ◆ storage and process temperatures may need to be carefully controlled to prevent dangerous decomposition or reaction;
- ◆ check labels and safety data sheets for physical properties and incompatibility with other materials.



EMERGENCIES

Whenever you work with flammable substances, there is the potential for something to go wrong. You need to think about possible problems and make sure everyone knows what to do in an emergency. Instructing staff in emergency procedures is an important part of their job training, and should be ongoing. Examples of things to think about are:

- ◆ make sure workers know enough to prevent the mixing of incompatible chemicals;
- ◆ lay down the procedures to be followed if there is a leak or spill of flammable material and make sure people know and understand them;
- ◆ if special first-aid facilities or equipment are required, then staff need to be trained in their use.

OTHER SOURCES OF INFORMATION

This leaflet has given you some basic guidance on the safe storage and use of flammable substances. Health and safety inspectors who might visit your premises will be looking to see how you have applied this guidance to help prevent fires. They will give you advice if you ask. You may also have a visit from, or wish to arrange one with, the Fire Prevention Officer from your local Fire Brigade. They will want to ensure that, in the event of fire starting, everybody can leave the premises quickly, and safely. They may also guide and advise you about fire extinguishers, fire alarms and other issues relating to fire safety.

The information in this leaflet is intended to be an introduction to some of the precautions needed for safe working with flammable substances. It may be all you need, but if not there is considerable further guidance available, as described in the 'Further reading' section.



FURTHER READING

Priced HSE publications

Fire precautions in the clothing and textile industries IAC Guidance HSE Books 2000
ISBN 0 7176 1786 6

Dispensing petrol: Assessing and controlling the risk of fire and explosion at sites where petrol is stored and dispensed as a fuel HSG146 HSE Books 1996 ISBN 0 7176 1048 9

Energetic and spontaneously combustible substances: Identification and safe handling HSG131 HSE Books 1995 ISBN 0 7176 0893 X

Use of LPG in small bulk tanks Chemical Information Sheet CHIS4 HSE 1999 Web only version available at <http://www.hse.gov.uk/pubns/gasindex.htm>

Small-scale use of LPG in cylinders Chemical Information Sheet CHIS5 HSE 1999 Web only version available at <http://www.hse.gov.uk/pubns/comahind.htm>

Safe handling of combustible dusts: Precautions against explosions HSG103 (Second edition) HSE Books 2003 ISBN 0 7176 2726 8

Safe use and storage of cellular plastics HSG92 HSE Books 1996 ISBN 0 7176 1115 9

The spraying of flammable liquids HSG178 HSE Books 1998 ISBN 0 7176 1483 2

Storage and handling of industrial nitrocellulose HSG135 HSE Books 1995 ISBN 0 7176 0694 5

Chemical warehousing: The storage of packaged dangerous substances HSG71 (Second edition) HSE Books 1998 ISBN 0 7176 1484 0

Safe use and handling of flammable liquids HSG140 HSE Books 1996 ISBN 0 7176 0967 7

The storage of flammable liquids in containers HSG51 (Second edition) HSE Books 1998 ISBN 0 7176 1471 9

The storage of flammable liquids in tanks HSG176 HSE Books 1998 ISBN 0 7176 1470 0

Dangerous substances and explosive atmospheres. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L138 HSE Books 2003 ISBN 0 7176 2203 7

Unloading petrol from road tankers. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L133 HSE Books 2003 ISBN 0 7176 2197 9

Design of plant, equipment and workplaces. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L134 HSE Books 2003 ISBN 0 7176 2199 5

Storage of dangerous substances. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L135 HSE Books 2003 ISBN 0 7176 2200 2

Control and mitigation measures. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L136 HSE Books 2003 ISBN 0 7176 2201 0

Safe maintenance, repair and cleaning procedures. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L137 HSE Books 2003 ISBN 0 7176 2202 9



Free HSE publications

Dispensing petrol as fuel: Health and safety guidance for employees Leaflet INDG216
HSE Books 1996 (single copy free)

Take care with oxygen: Fire and explosion hazards in the use of oxygen Leaflet HSE8(rev2)
HSE Books 1999 (single copy free or priced packs of 10 ISBN 0 7176 2474 9)

Read the label: How to find out if chemicals are dangerous Leaflet INDG352 HSE Books
2002 (single copy free or priced packs of 15 ISBN 0 7176 2366 1)

Safe use of petrol in garages Leaflet INDG331 HSE Books 2000 (single copy free or priced
packs of 10 ISBN 0 7176 1836 6)

*The idiot's guide to CHIP 3: Chemicals (Hazard Information and Packaging for Supply)
Regulations 2002* Leaflet INDG350 HSE Books 2002 (single copy free or priced packs of 5
ISBN 0 7176 2333 5)

FURTHER INFORMATION

HSE priced and free publications are available by mail order from
HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165
Fax: 01787 313995 Website: www.hsebooks.co.uk (HSE priced publications are
also available from bookshops and free leaflets can be downloaded from HSE's
website: www.hse.gov.uk.)

For information about health and safety ring HSE's Infoline
Tel: 0845 345 0055 Fax: 0845 408 9566 Textphone: 0845 408 9577
e-mail: hse.infoline@natbrit.com or write to HSE Information Services,
Caerphilly Business Park, Caerphilly CF83 3GG.

This leaflet contains notes on good practice which are not compulsory but
which you may find helpful in considering what you need to do.

This leaflet is available in priced packs of 15 from HSE Books,
ISBN 0 7176 1154 X. Single free copies are also available from
HSE Books.

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